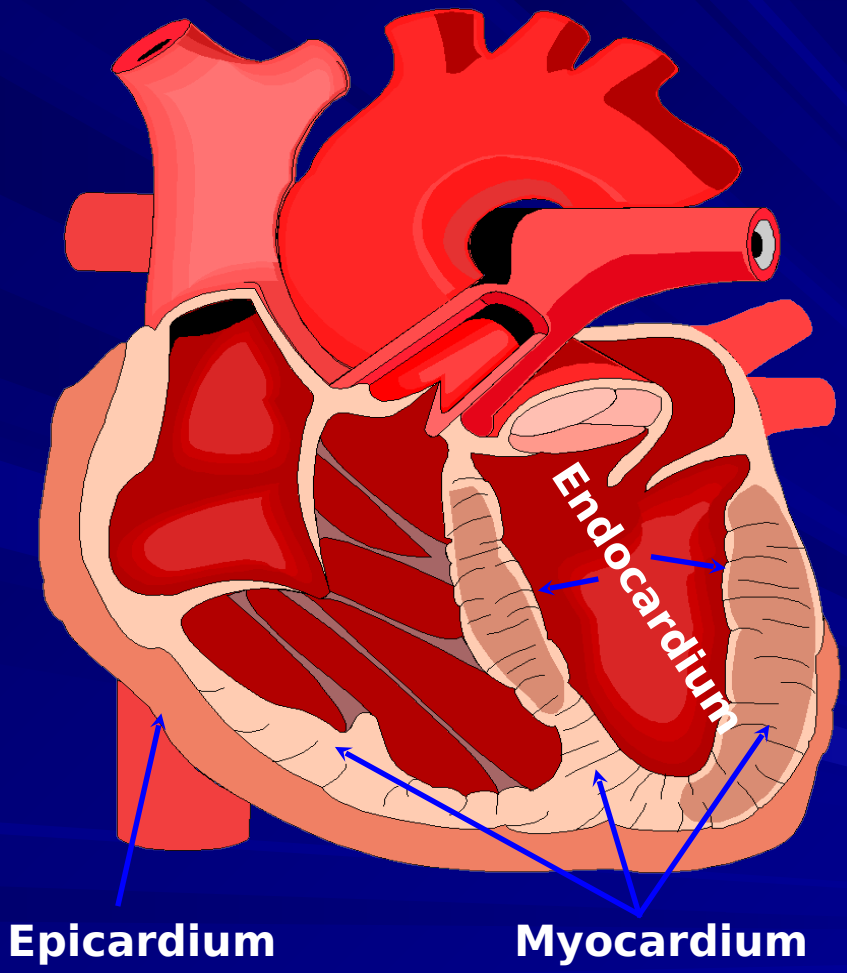
Chest Trauma Management

General

- Chest injuries may result from:
  - Gunshot wounds (GSW)
  - Shrapnel
  - Explosions
  - Motor vehicle crashes (MVC)
  - Falls
  - Crush injuries
  - Stab wounds

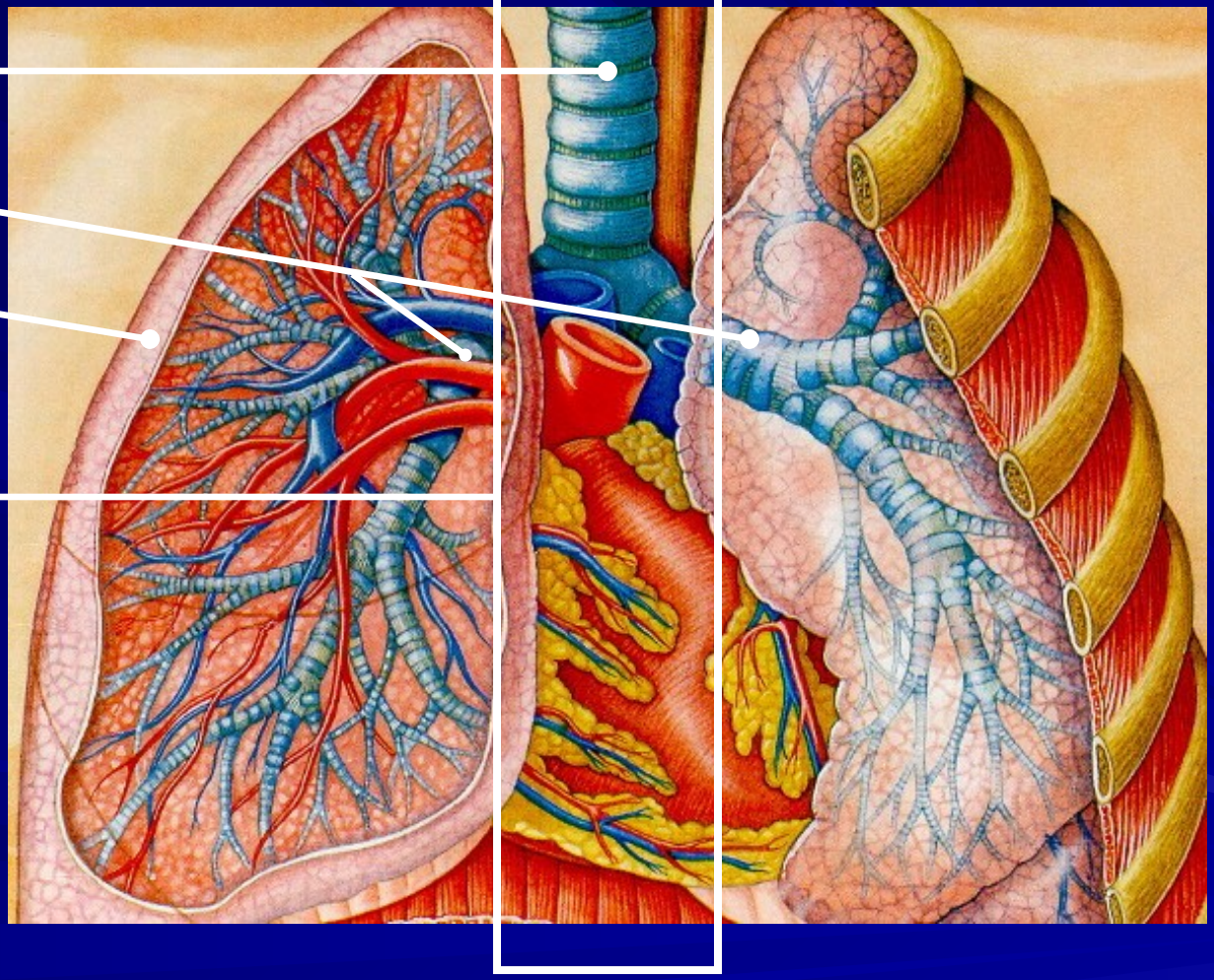
Organs of the Thorax

- Heart

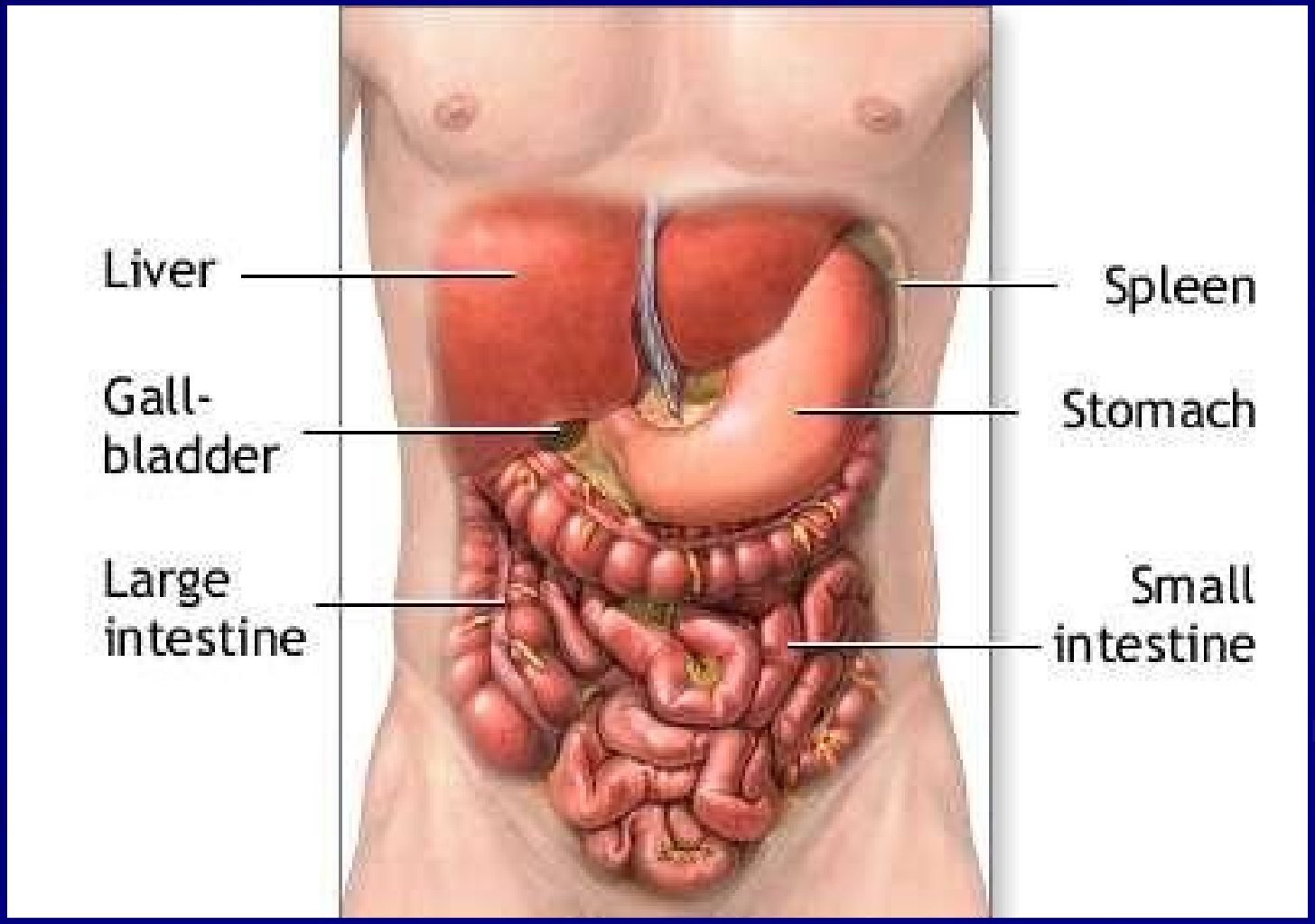


Organs of the Thorax

- Trachea
- Bronchi
- Lungs
- Mediastinum



Organs of the Abdomen

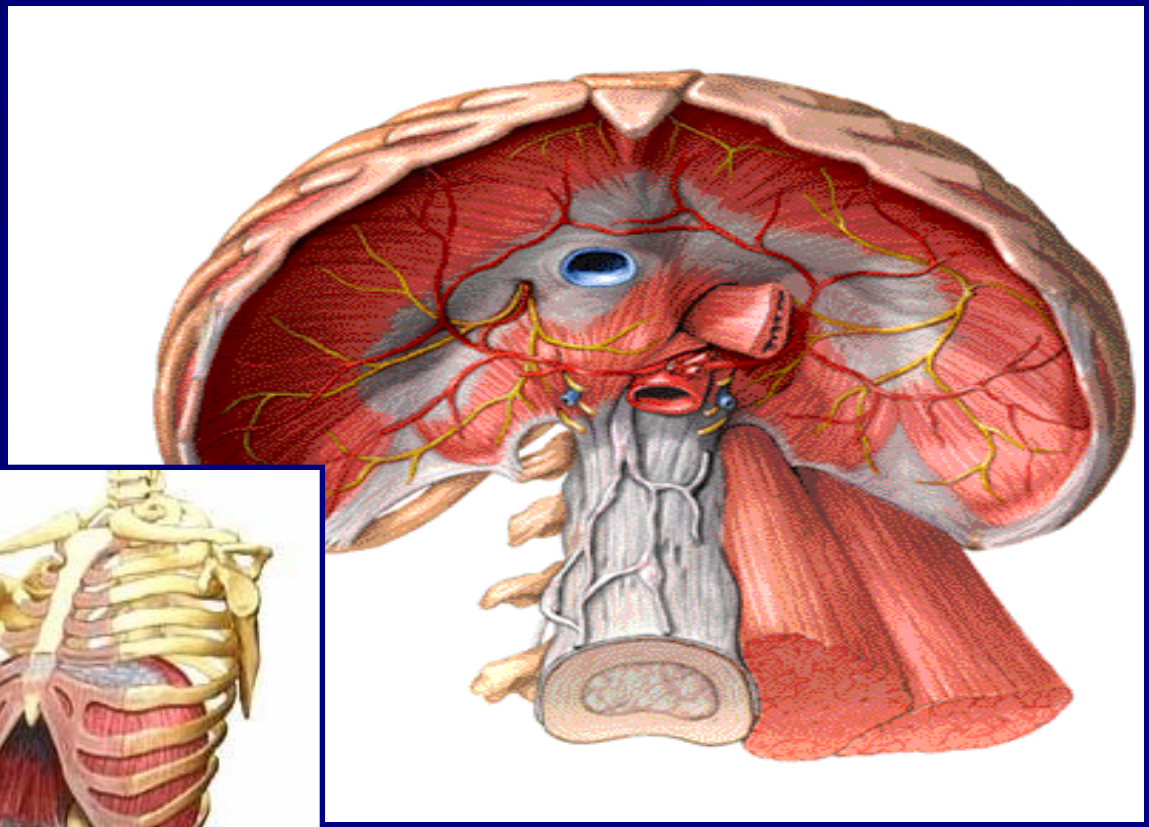


Organs of the Abdomen

- Muscles

Organs of the Abdomen

- Diaphragm



Determine the MOI

- Penetrating trauma.
  - GSW or stab wounds
  - Concentrates forces over smaller area
  - Bullet trajectories unpredictable
- Blunt trauma.
  - Force distributed over larger area
  - Visceral injuries occur from:
    - Deceleration
    - Compression
    - Sheering forces
    - Bursting

Assess the Casualty

- Identify signs and symptoms:
  - Assess mental status (AVPU)
  - Assess the airway
  - Assess the breathing
  - Assess the circulation

Signs Indicative of Chest Injury

- Shock.
- Cyanosis.
- Hemoptysis.
- Chest wall contusion.
- Flail chest.
- Open wounds.
- Jugular vein distention (JVD).
- Tracheal deviation.

Assess Respirations

- Respiratory rate and effort:
  - Tachypnea
  - Bradypnea
  - Labored
  - Retractions
  - Progressive respiratory distress

Assess the Neck

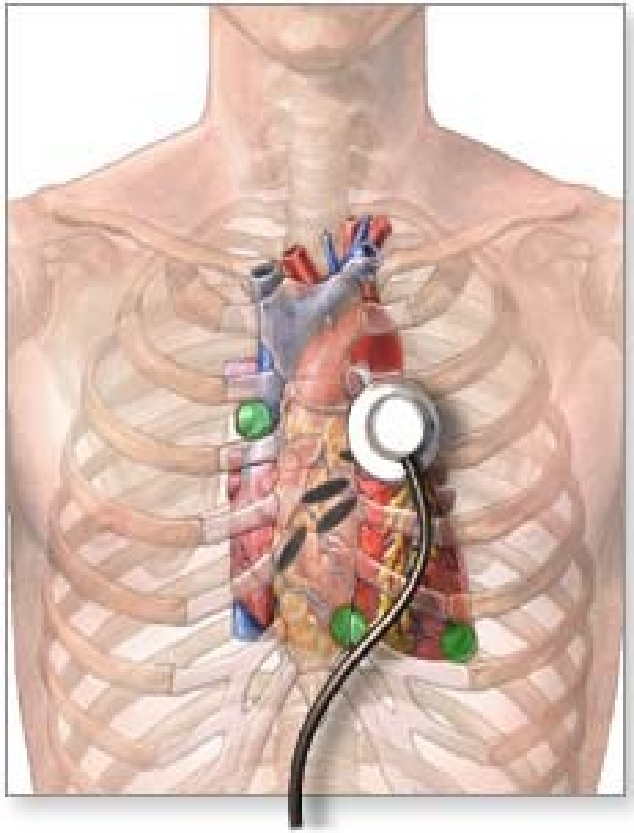
- Position of trachea.
- Subcutaneous emphysema.
- JVD.

Assess the Chest Wall

- Contusions.
- Tenderness.
- Asymmetry.
- Open wounds or impaled objects.
- Crepitation.
- Paradoxical movement

Assess the Chest Wall

- Lung sounds:
  - Absent or decreased
    - Unilateral
    - Bilateral
  - Location
  - Bowel sounds in chest?



Assess the Chest Wall

- Lung sounds – Percussion.
  - Hyperresonance
    - Pneumothorax
    - Tension pneumothorax
  - Hyporesonance (hemothorax)

Assess the Chest Wall

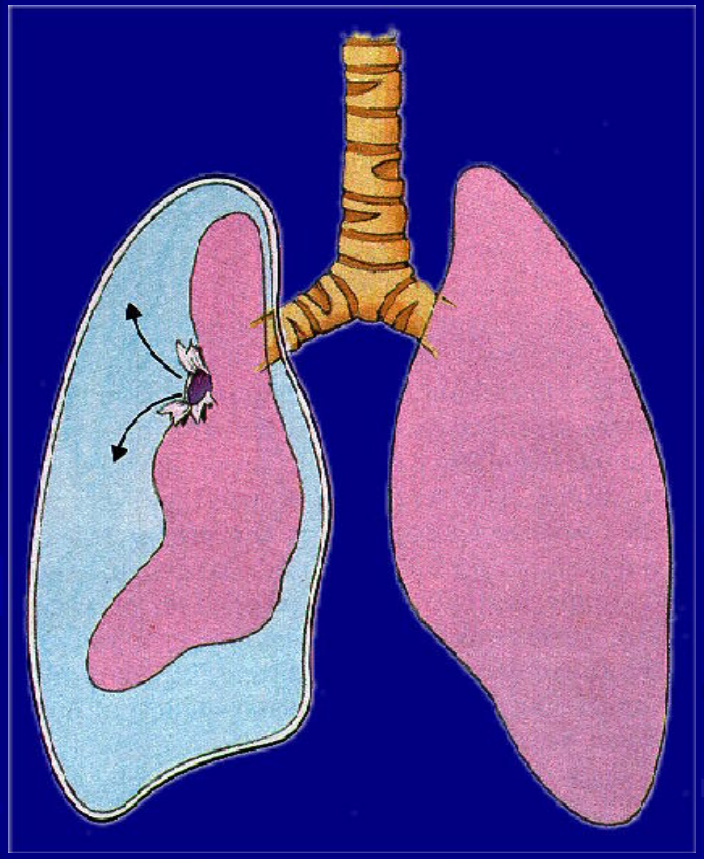
- Compare both sides of the chest at the same time when assessing for asymmetry.

Chest Physiology

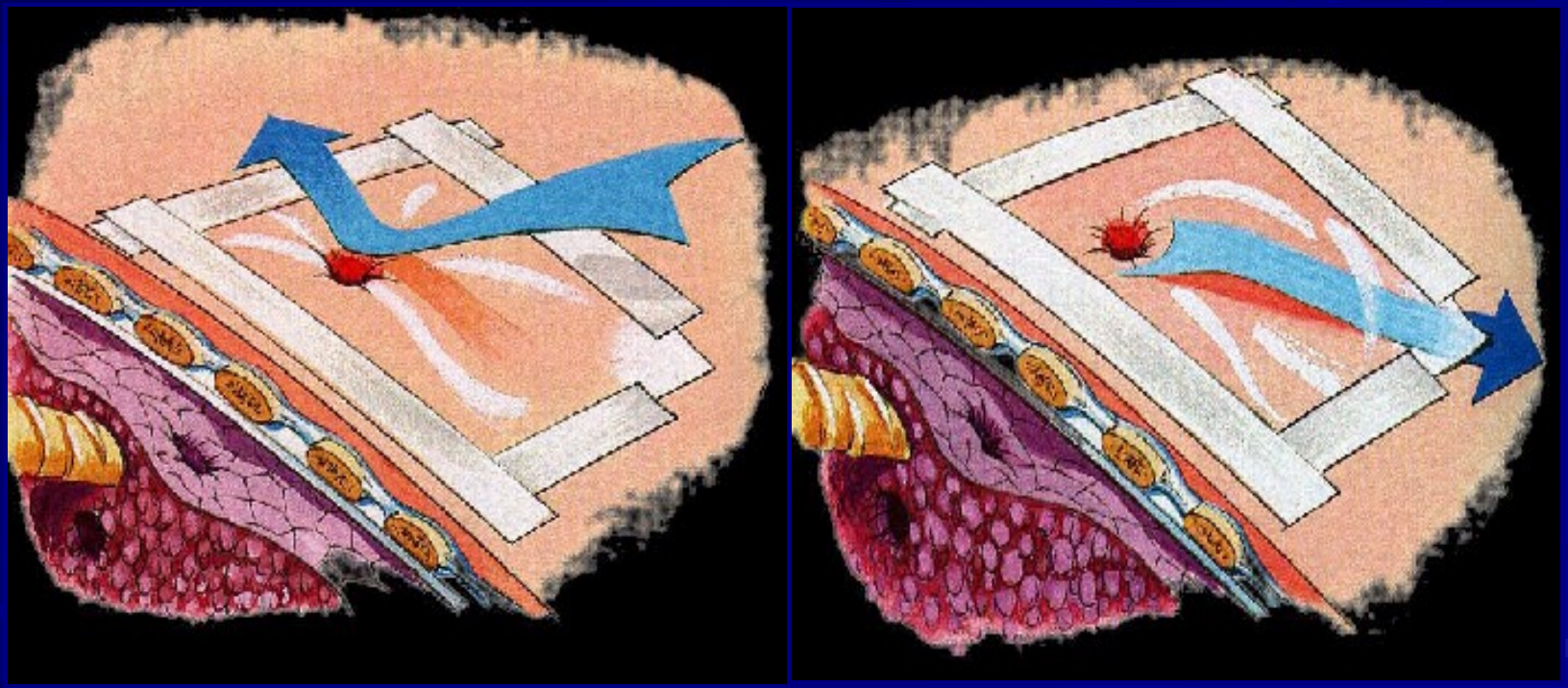
- Chest normally has negative pressure.
- Penetrating wound creates a positive pressure in chest cavity.
- Air will enter the easiest route. If a hole in the chest is smaller than 2/3 the size of the trachea, air will enter through the trachea preferentially and not through the hole in the chest.

Open Pneumothorax

- Caused by penetrating thoracic injury.
- May present as a “sucking chest wound” if > 2/3 diameter of the trachea.



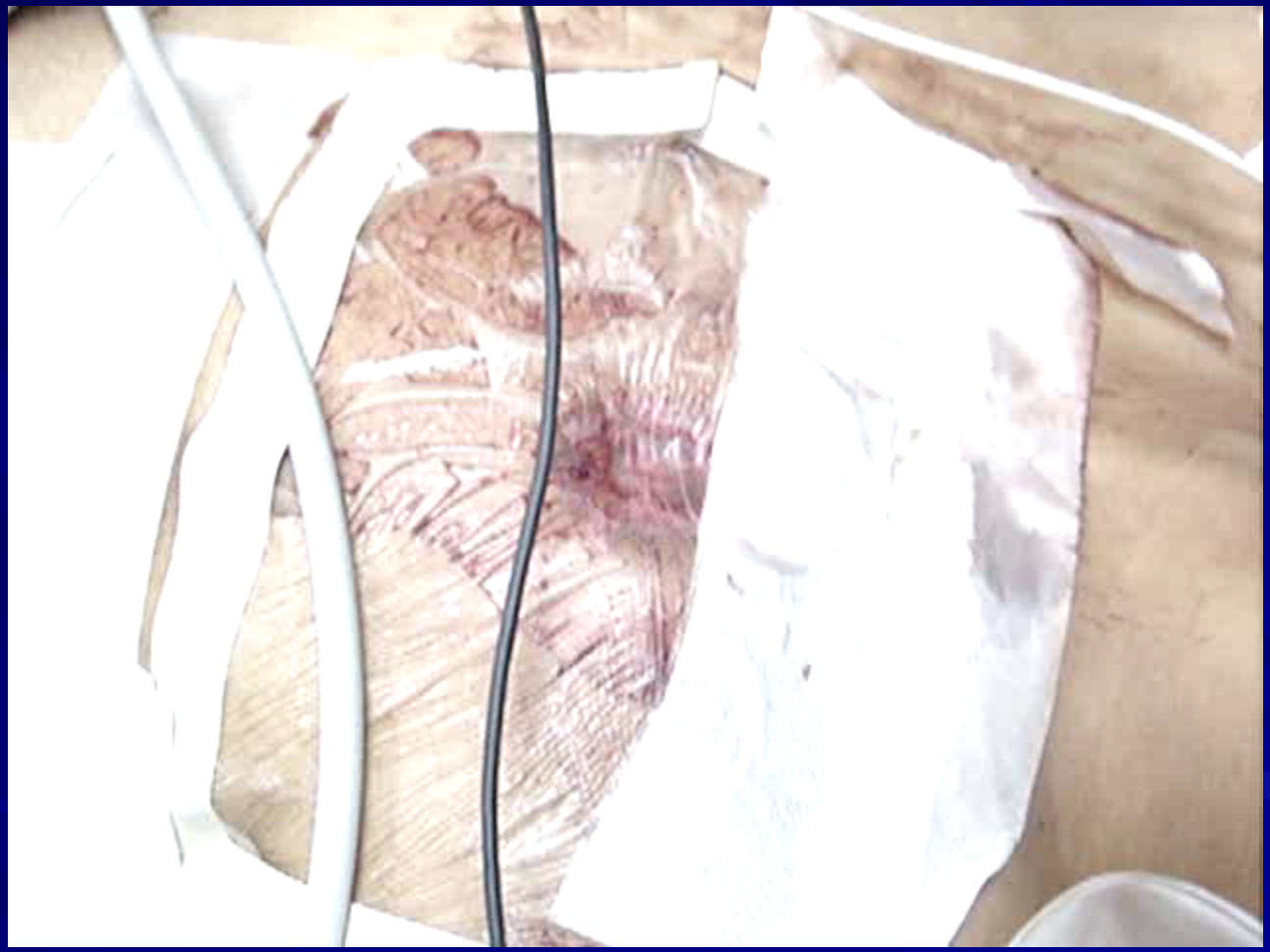
Open Pneumothorax



Open Pneumothorax

Click on picture for video

Open Pneumothorax



Click on picture for video

Open Pneumothorax

- Management:
  - Ensure an open airway
  - Close the chest wall defect, both entrance and exit with an occlusive dressing, petrolatum gauze or Asherman Chest Seal®
  - Place the casualty in the sitting position
  - Monitor respirations after an occlusive dressing is applied

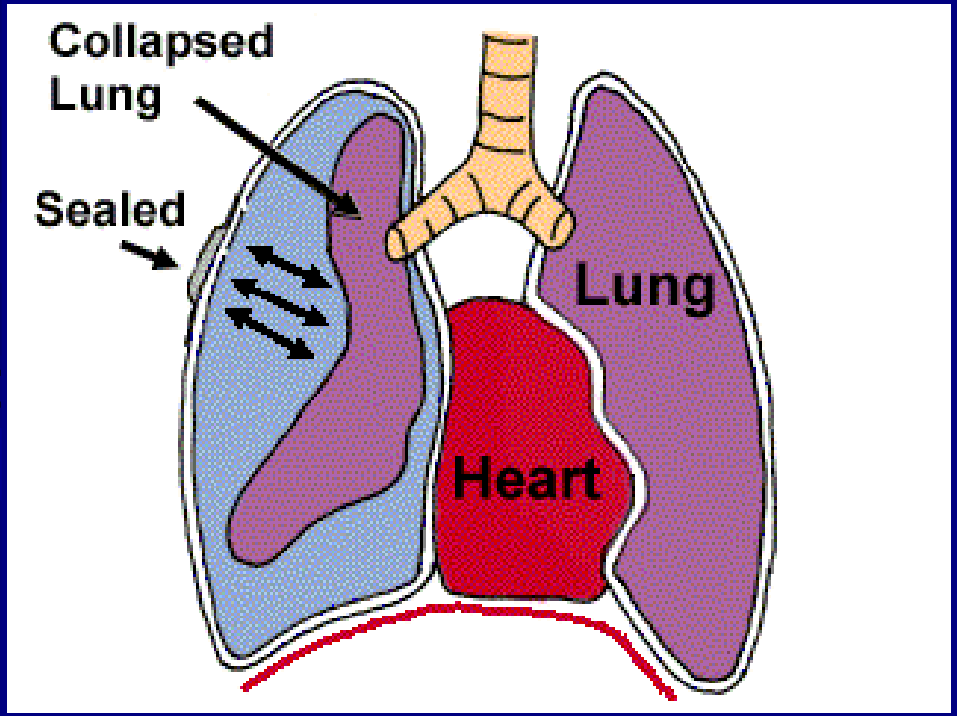
Open Pneumothorax

- Petroleum Gauze can also be used to seal a sucking chest wound.

"Asherman Chest Seal®"

Tension Pneumothorax

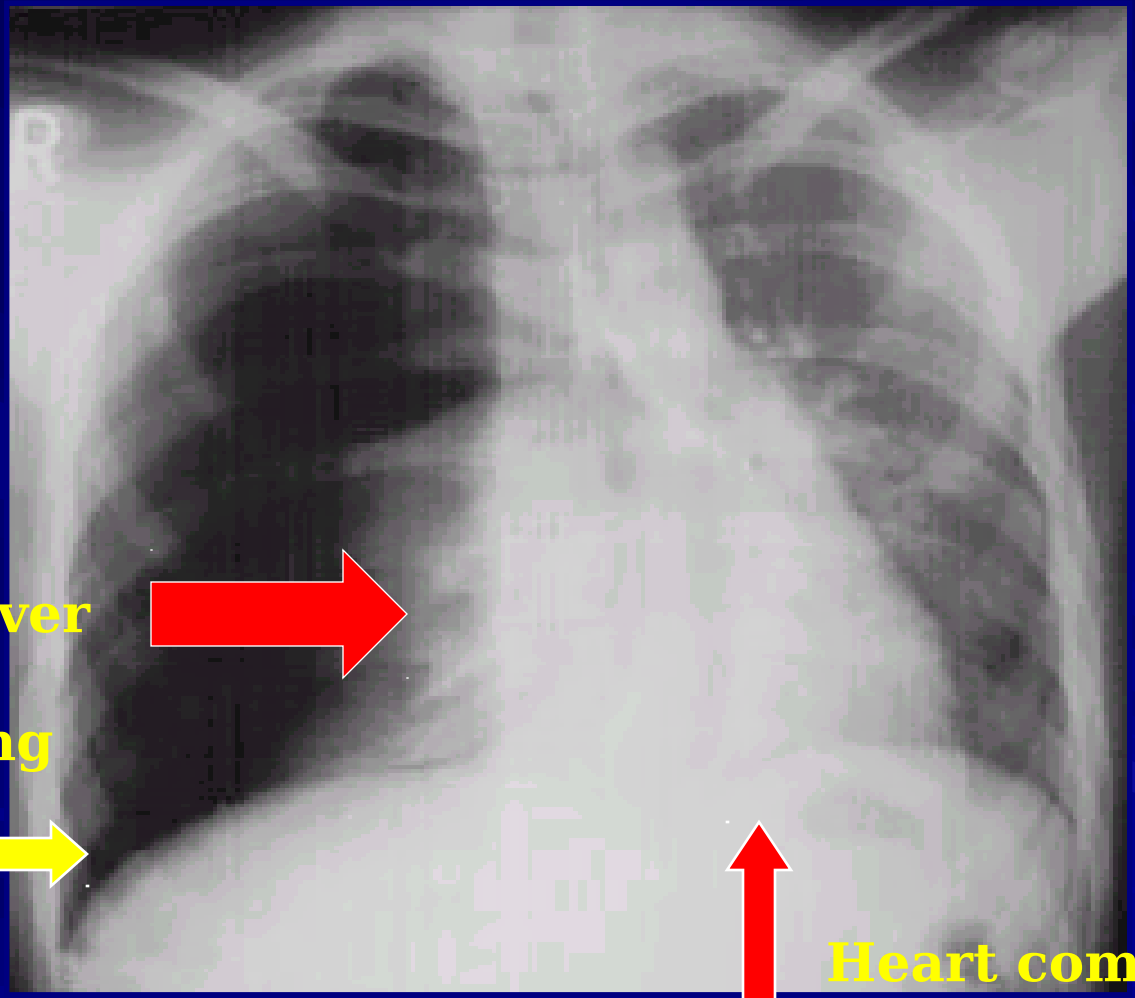
- One-way valve created from penetrating trauma.
- Air enters thoracic space but cannot escape.
- Pressure builds:



Tension Pneumothorax

- If after sealing the open pneumothorax, the casualty develops progressive difficulty breathing, consider this a tension pneumothorax and perform a needle chest decompression.
- If no capability of NCD exists and the casualty continues to have progressive respiratory distress, remove the occlusive dressing and stick a gloved finger into the open wound and attempt to “burp” the wound.

Tension Pneumothorax



Air pushes over heart and collapses lung

Air outside lung from wound

Heart compressed not able to pump well

Tension Pneumothorax

- Clinical presentation:
  - Anxiety, agitation, apprehension
  - Diminished or absent breath sounds
  - Increasing dyspnea with cyanosis
  - Tachypnea
  - Hyperresonance to percussion on affected side
  - Hypotension, cold clammy skin
  - Casualty begins to deteriorate rapidly

Tension Pneumothorax

- Clinical presentation (cont'd):
  - JVD and cyanosis
  - Decreased lung compliance (intubated)
  - Tracheal deviation (*late*)

  * These signs are hard to detect in a combat environment.

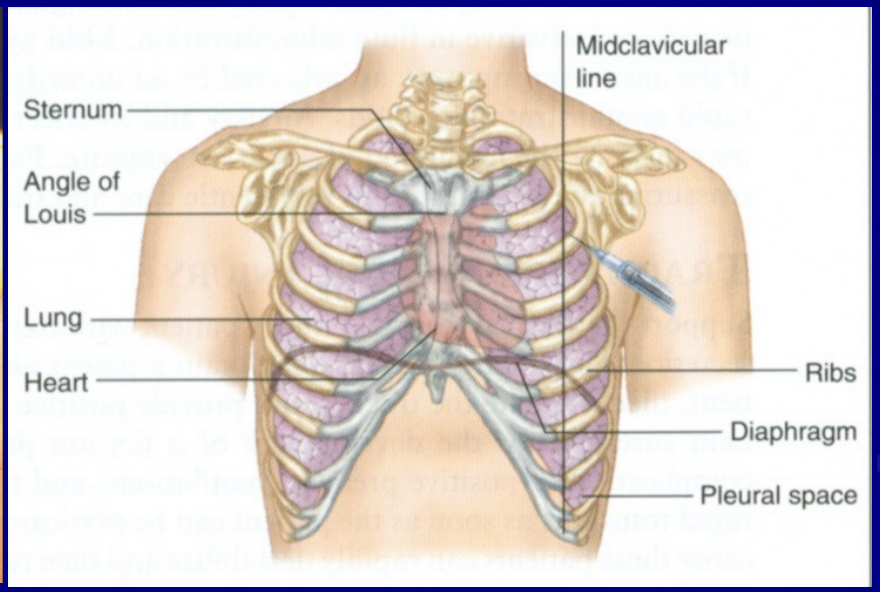
Tension Pneumothorax

- Management:
  - Ensure an open airway
  - Decompress the affected side

- Indications:
  - Penetrating chest wound with progressive respiratory distress

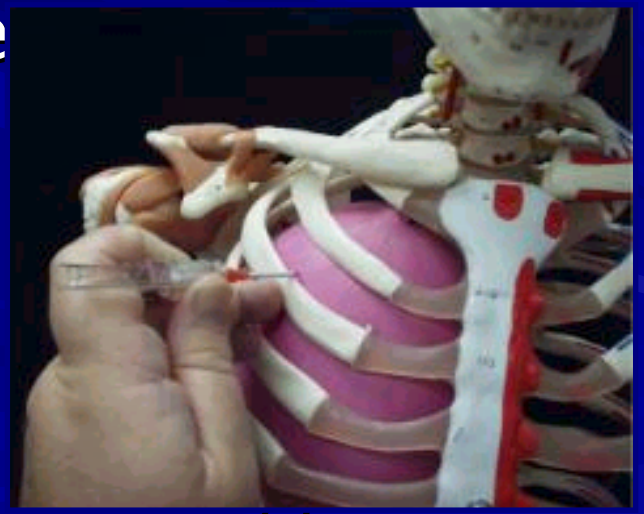
Needle Chest Decompression

- Procedure:
  - Identify the second ICS on the anterior chest wall, MCL:



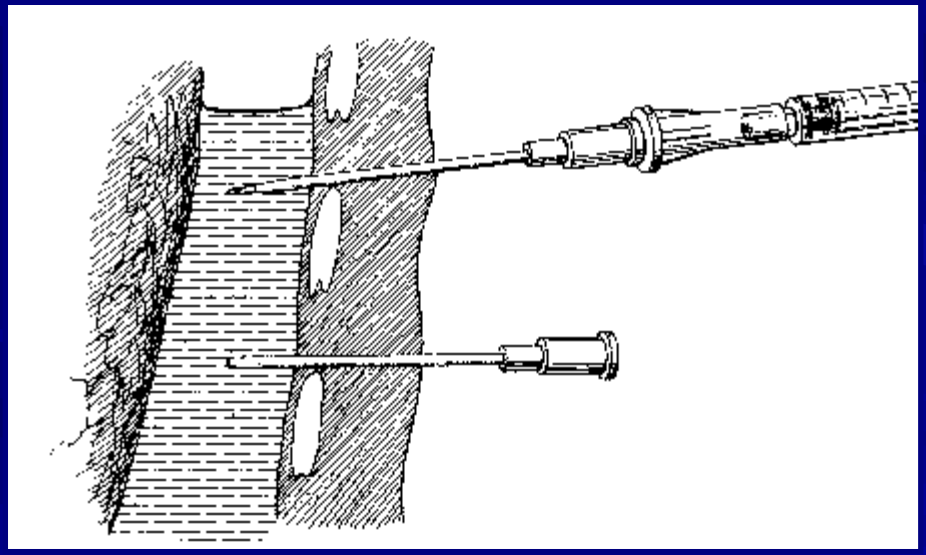
Needle Chest Decompression

- Prep the area with an antimicrobial agent.
- Insert a 14 ga. Catheter at a 90° angle over the the 3rd rib, into the [illegible] at the
- Needle should be long enough to enter the chest cavity (2½ – 3 inches)



Needle Chest Decompression

- If a tension pneumothorax is present, a “hiss of air” may be heard escaping from the chest cavity.
- Remove the needle, leave the catheter in place.

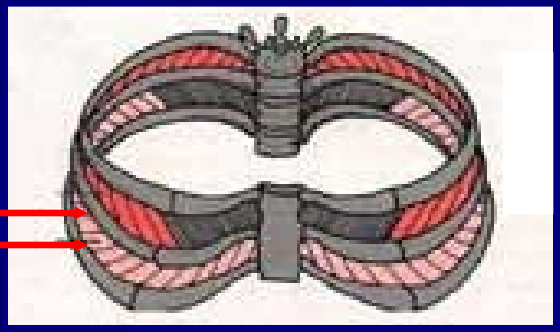


Needle Chest Decompression

- Tape the catheter hub to the chest wall.
- The casualty's condition should rapidly improve.
- Evacuate ASAP.

Needle Chest Decompression

- Questions:
  - Over top or bottom of rib? Why?



  - What if casualty doesn't have a tension pneumothorax and you perform NCD?
    - Already has hole(s) in chest
    - Probably larger than diameter of 14 ga. needle
    - No additional damage

Needle Chest Decompression

- Questions:
  - Will lung re-inflate after pressure is released from chest cavity?
  - No; to re-inflate the lung you must have a chest tube with suction and or positive pressure ventilation.

Needle Chest Decompression

- Questions:
  - So if the NCD does not re-inflate the lung what does it do?
  - We are simply converting a tension pneumothorax to a standard pneumothorax; this is much more survivable than a tension pneumothorax.

Needle Chest Decompression

- Complications:
  - Insertion of the needle over the top of the rib prevents laceration of the intercostal vessels or nerve which can cause hemorrhage or nerve damage.

Summary

- Injuries to the chest are fewer in nature secondary to modern body armor; however, it doesn't protect 100%.

- Penetrating wounds to the chest can be rapidly fatal if not identified early and treated appropriately.

Questions?